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Forest Insect and Disease Conditions in the Southwestern Region, 1995

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Introduction

Over the years there has been much discussion (and some concern expressed) about the "health" of our western forests. Catastrophic wildfires, insect outbreaks, chronic disease situations, and many other situations all suggest that the condition of our forests is less than ideal. Nevertheless, we realize that some "disturbances" are normal in the functioning of a forest. Ideally, then, we might attempt to manage the forest to maintain insects and diseases within their "natural ranges of variability." Unfortunately, we are far from determining what these ranges are.

The loss of significant amounts of aspen and high elevation ponderosa pine, what appear to be increases in the incidence of dwarf mistletoes, and the introduction of exotic pests such as white pine blister rust are among our concerns with the condition of Southwestern forests. Evidence from many parts of the Western U.S. indicates that there have been significant changes in the structure of our forests, particularly in the ponderosa pine type, since pre-European settlement. While "pre-settlement" conditions may not be "desired" conditions (or feasible to achieve over large areas), they should provide us much insight of the historical trends of insect and disease populations and their effects in Southwestern forests.

Another major concern is the vast number of acres which are densely stocked and vulnerable to attack by bark beetles. We believe that it is just a matter of time before some significant bark beetle outbreaks occur across the Region. In fact, we are monitoring the increased bark beetle activity that has occurred over the past 4 years in the southern forests of New Mexico and Arizona.

While there is still much to be learned about insects, diseases, other disturbance agents, and ecosystem function in general, given what we already know, it appears there is more we could be doing to improve the condition of our forests.

We believe that attention should and will continue to be given to limiting damage from forest insects and diseases as we implement ecosystem management. At the same time, it is important that we take a more "holistic" look at insects and pathogens, long considered "forest pests", for a better understanding of their ecological roles. The beneficial roles of certain forest insects and diseases—their role in nutrient cycling, for example—have long been recognized.

Our approach toward the management of forest insects and diseases has continued to change with new information and new ideas. For example, we no longer say "if it has toe it has to go", but participate with land managers in an objective analysis of the amount of dwarf mistletoe infection and its effects across the landscape. If treatments are necessary to complete project objectives, traditional and nontraditional tools of silviculture, such as prescribed fire, can be used to reduce the infection levels of dwarf mistletoe and other insects and diseases.

The concept of "scale" is a major framework in the current approach to ecosystem management. Decisions are to involve analysis at multiple scales, with more emphasis placed on analysis of larger geographical areas using such tools as GIS. How will insect and disease information be incorporated into this type of decision making? Our Region-wide aerial detection surveys summarize insect activity for the entire Southwest. Specific locations of affected areas across a landscape are available, on maps and in data bases for both Forests and Districts. Some historical information based on previous surveys is also available.

Our ability to alter a forest landscape toward a desired condition depends upon treatments of smaller areas traditionally called stands. While analysis at broader scales may be important, there is no substitute for good stand information, particularly "on-the-ground knowledge," when treatments are being considered. Selection and marking greatly affect the outcome of treatments, and ultimately, what the forest will look like long into the future. Our staff is available to assist with biological evaluations of insect and disease conditions in the forest, as well as to provide input at all levels of the decision-making process.

This report summarizes the status of insects and diseases in the forests of the Southwest. Much of the insect information is based on aerial detection surveys. Most of the disease information is based on ground observations and surveys. The information on State and private lands was contributed by Bob Celaya, Forest Pest Specialist, Arizona State Land Department; and Bob Cain, Extension Forest Entomologist, New Mexico State University Cooperative Extension Service.

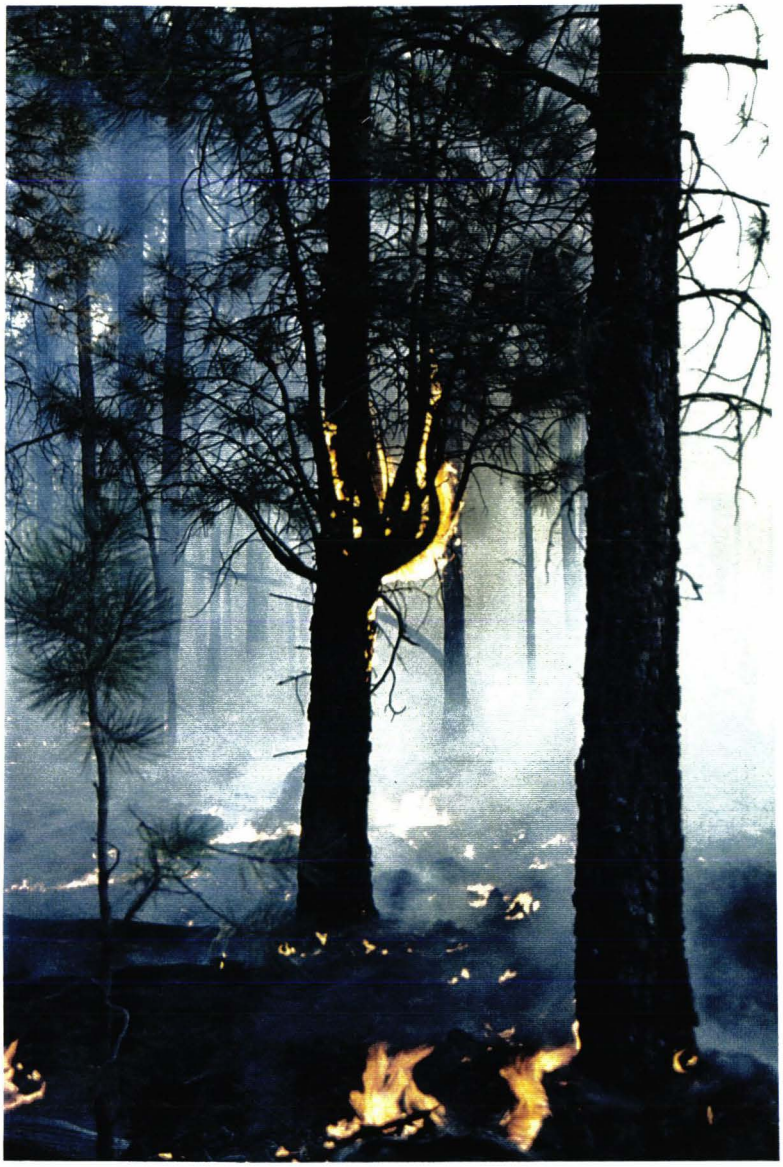

Figure 1. A dwarf mistletoe broom ignites during a prescribed burn.

Conditions in Brief

In the Southwest, bark beetle-killed trees increased from 37,730 acres in 1994 to 39,375 acres in 1995. Within the ponderosa pine forest cover type, tree mortality was caused by the roundheaded pine beetle (29,900 acres), *Ips* beetles (2,500 acres), western pine beetle (1,910 acres), and mountain pine beetle (570 acres). In the mixed conifer and spruce-fir forest cover types, Douglas-fir, fir engraver, and spruce beetle-caused tree mortality occurred on 570, 2,685, and 1,240 acres, respectively.

Insect defoliator activity Region-wide decreased from 378,200 acres in 1994 to 205,095 acres in 1995. The large majority of this defoliation was caused by the western spruce budworm (190,855 acres) and a complex of large aspen tortrix, western tent caterpillar, marssonina leaf blight, and abiotic factors (14,240 acres).

Dwarf mistletoes continued to be the primary cause of growth loss (other than dense stocking) in both mixed conifer and ponderosa pine cover types. They are estimated to cause an annual conifer volume loss of 25 million cubic feet. Both direct and indirect evidence suggests that the incidence and severity of these parasites has increased during this century.

The most common root rots in the Region are *Armillaria* spp. and *Heterobasidion annosum*. They are responsible for 5 million cubic feet of annual volume loss and create hazard trees in campgrounds and along roadways. Incidence in mixed conifer and spruce-fir cover types is higher than in the pine cover type. Similar to other indigenous diseases, root and butt rots can be beneficial to some wildlife species because they create snags and downed logs.

White pine blister rust occurs throughout most of the range of southwestern white pine on two Ranger Districts of the Lincoln National Forest and the Mescalero Apache Indian Reservation in New Mexico. It has not been detected elsewhere in the Region.

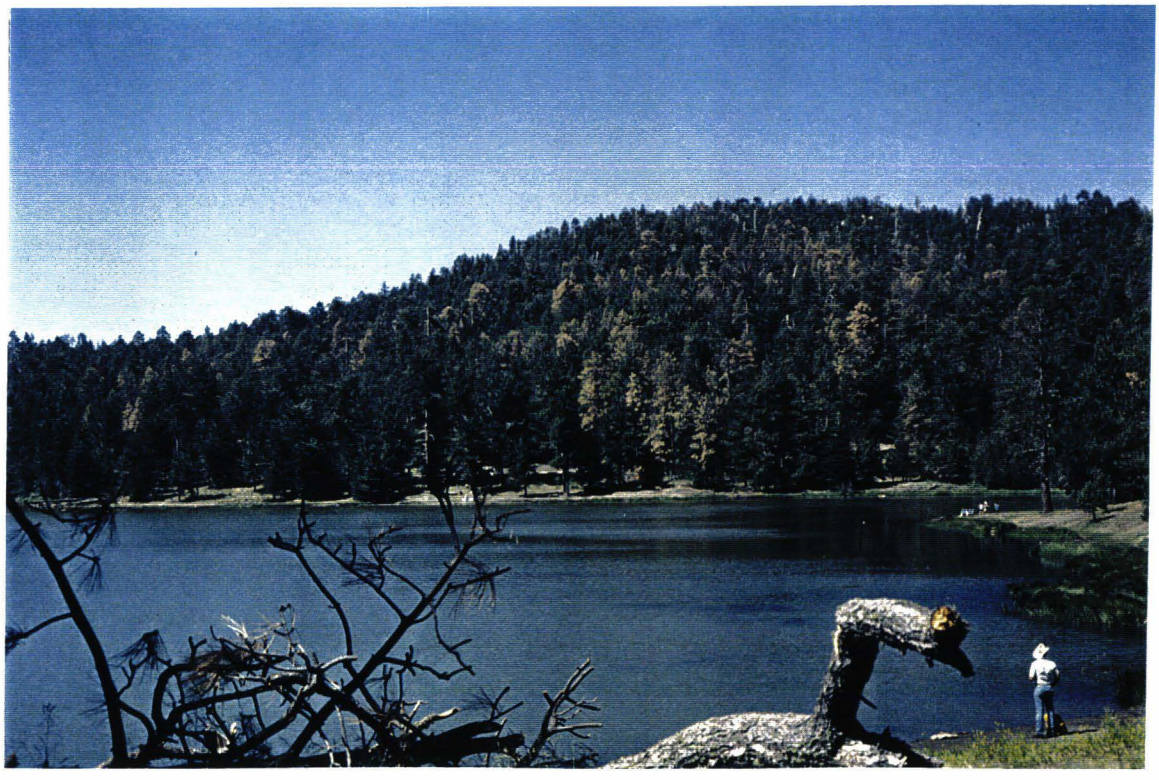

Figure 2. Roundheaded pine beetle caused mortality in southern Arizona.

Table 1. Prominent 1995 Forest Insect and Disease Activity (acres) in Arizona and New Mexico by Land Ownership and Agent.

Damage Agent	State	National Forests	State & Private	Other Federal	Total
Roundheaded Pine Beetle	AZ	310	**	0	310
	NM	12,295	**	17,295	29,590
Ips Beetle	AZ	1,280	**	180	1,460
	NM	1,040	**	0	1,040
Douglas-fir Beetle	AZ	530	**	40	570
	NM	0	**	0	0
Mountain Pine Beetle	AZ	180	**	60	240
	NM	330	**	0	330
Spruce Beetle	AZ	120	**	15	135
	NM	1,015	**	90	1,195
Western Pine Beetle	AZ	250	**	95	345
	NM	1,565	**	0	1,565
Fir Engraver Beetle	AZ	1,770	**	770	2,540
	NM	145	**	0	145
Pinyon Pine Needle Scale	AZ	0	**	0	0
	NM	50,400	**	0	50,400
Ponderosa Pine Needle Miner	AZ	0	**	0	0
	NM	4,300	**	0	4,300
Western Spruce Budworm	AZ	7,065	0	0	7,065
	NM	118,520	51,500	13,770	183,790
Aspen Defoliation	AZ	1,930	**	775	2,705
	NM	11,120	**	420	11,540
Root Diseases	AZ	219,000	**	**	219,000
	NM	860,000	**	**	860,000
Dwarf Mistletoes	AZ	1,040,000	674,000	25,000	1,739,000
	NM	1,114,000	348,000	581,000	2,069,000

***** = No data available.**

Status Of Insects

Douglas-fir Beetle

Dendroctonus pseudotsugae

Hosts: Douglas-fir

Douglas-fir beetle-caused tree mortality decreased slightly Region-wide from 695 acres in 1994 to 570 acres in 1995. Mortality occurred on the Apache-Sitgreaves National Forests (240 acres), Coconino National Forest (140 acres), Kaibab National Forest (150 acres), and the Fort Apache Indian Reservation (40 acres), Arizona. No Douglas-fir beetle activity was detected on Federal lands in New Mexico.

On State and private lands in northern New Mexico, small, expanding pockets of Douglas-fir beetle-caused tree mortality were detected on the north slopes of Gallinas Canyon in western San Migel County.

Ips Beetle

Ips spp.

Hosts: Ponderosa pine

Ips beetle-killed trees were detected on 4,135 acres in 1994 compared to 2,500 acres of the ponderosa pine forest cover type in 1995. Mortality occurred on the Coconino National Forest (170 acres), Coronado National Forest (130 acres), Kaibab National forest (50 acres), Prescott National Forest (120 acres), Tonto National Forest (810 acres), San Carlos Indian Reservation (100 acres), and Fort Apache Indian Reservation (80 acres), Arizona; and the Lincoln National Forest (1,040 acres), New Mexico.

Mountain Pine Beetle

Dendroctonus ponderosae

Hosts: Ponderosa pine

Tree mortality resulting from mountain pine beetle attacks decreased from 1,990 acres in 1994 to 570 acres in 1995. Mountain pine beetle killed trees were detected on the Kaibab National Forest (180 acres), Arizona; and the Santa Fe National Forest (330 acres) and Navajo Indian Reservation (60 acres), New Mexico.

Roundheaded Pine Beetle

Dendroctonus adjunctus

Hosts: Ponderosa pine

Roundheaded pine beetle-caused tree mortality increased from 24,840 acres in 1994 to 29,900 acres of host type in 1995. Mortality occurred on the Coronado National Forest (310 acres), Arizona; and the Lincoln National Forest (12,295 acres) and Mescalero Indian Reservation (17,295 acres), New Mexico.

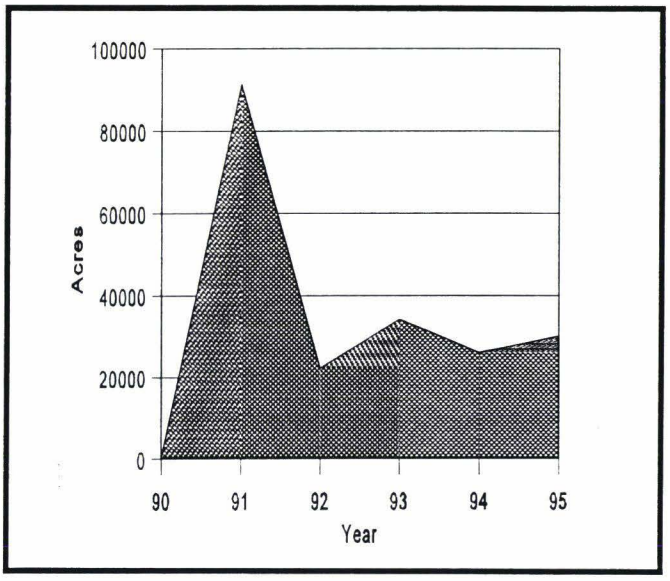

Figure 3. Roundheaded Pine Beetle mortality Region-wide.

Spruce Beetle

Dendroctonus rufipennis

Hosts: Spruce

Spruce beetle-caused tree mortality increased from 760 acres in 1994 to 1,240 acres in 1995. Mortality was detected on the Coconino National Forest (10 acres), Kaibab National Forest (110 acres), and the Fort Apache Indian Reservation (15 acres), Arizona; and the Carson National Forest (175 acres), Cibola National Forest (360 acres), Gila National Forest (30 acres), Lincoln National Forest (215 acres), Santa Fe National Forest (235 acres) and Navajo Indian Reservation (90 acres), New Mexico.

Western Pine Beetle

Dendroctonus brevicomis

Hosts: Ponderosa pine

Western pine beetle-killed trees decreased from 2,170 acres of host type in 1994 to 1,910 acres in 1995. Mortality on Federal lands in Arizona included the Apache-Sitgreaves National Forests (70 acres), Coconino National Forest (90 acres), Coronado National Forest (10 acres), Kaibab National Forest (35 acres), Tonto National Forest (45 acres), Fort Apache Indian Reservation (90 acres), and the Hualupai Indian Reservation (5 acres), Arizona; and the Cibola National Forest (10 acres) and Gila National Forest (1,555 acres), New Mexico

Fir Engraver Beetle

Scolytus ventralis

Hosts: True firs

Tree mortality from fir engraver beetle attacks decreased from 3,140 acres in 1994 to 2,685 acres of susceptible host type in 1995. Mortality on Federal lands in Arizona occurred on the Apache-Sitgreaves National Forests (280 acres), Coconino National Forest (10 acres), Kaibab National Forest (1,480 acres), and Fort Apache Indian Reservation (80 acres), Arizona; the Carson National Forest (120 acres), Lincoln National Forest (25 acres) and Navajo Indian Reservation (690 acres), New Mexico.

Western Spruce Budworm

Choristoneura occidentalis

Hosts: True firs, Douglas-fir, Spruce

Western spruce budworm defoliation increased in Arizona from being undetectable in 1994 to a total of 7,065 acres in 1995. Areas experiencing defoliation included the Apache-Sitgreaves National Forests (6,475 acres) and the Kaibab National Forest (590 acres). In New Mexico, defoliation decreased from 369,170 acres in 1994 to 183,790 acres in 1995. On Federal lands defoliation occurred on the Carson National Forest (101,760 acres), Cibola National Forest (5,000 acres), Gila National Forest (880 acres), Lincoln National Forest (720 acres), Santa Fe National Forest (10,160 acres), Jemez Pueblo Indian Reservation (280 acres), Santa Clara Pueblo Indian Reservation (480 acres), Taos Pueblo Indian Reservation (5,560 acres), and the Navajo Indian Reservation (7,450 acres). Defoliation on nonindustrial state and private lands in northern New Mexico totaled 51,500 acres of susceptible mixed conifer host type.

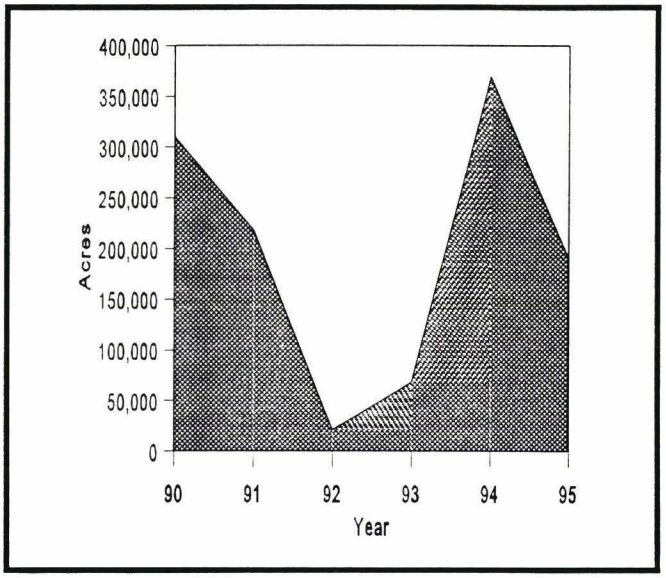

Figure 4. Western Spruce Budworm defoliation Region-wide.

Pinyon Pine Needle Scale

Matsucoccus acalyptus

Hosts: Pinyon pine

Pinyon pine defoliation caused by the pinyon pine needle scale was detected on 50,400 acres of host type in New Mexico. Defoliation caused by these insects was detected on the Magdalena (34,000 acres) and Mountainair (560 acres) Ranger Districts, Cibola National Forest; Silver City (9,600 acres) and Wilderness (240 acres) Ranger Districts, Gila National Forest; and Smokey Bear Ranger District (6,000 acres), Lincoln National Forest.

Ponderosa Pine Needle Miner

Coleotechnites ponderosae

Hosts: Ponderosa pine

Noticeable defoliation of ponderosa pine caused by this defoliator occurred on private lands in San Migel and Mora counties, New Mexico. The most significant population rise occurred south of Las Vegas, in the Mineral Hill and San Geronimo areas. Total acres defoliated was estimated at 4,300 acres.

Douglas-fir Tussock Moth

Orgyia pseudotsugata

Hosts: Douglas-fir, True firs, Spruce

The Douglas-fir tussock moth caused moderate defoliation damages to blue spruce, white fir, and Douglas-fir in Santa Fe, Los Alamos, and White Rock, New Mexico. Light tussock moth feeding damages were also noted by State personnel in Raton, New Mexico.

Pine Tip Moths

Rhyaciona spp.

Hosts: Pines

Landscape pines in New Mexico, particularly ponderosa pine, were severely damaged by several tip moth species of the genus *Rhyaciona*. The Nantucket and western pine tip moths appear to be causing the most severe damage to ornamental pines.

Twig Beetles

Pityophthorus spp.

Host: Pines

Drought conditions in southern New Mexico have contributed to notable forest and woodland outbreaks of twig beetles. Several hundred acres of pinyon and scattered ponderosa pine on State and private lands have been killed by a combination of twig beetles and *Ips* engraver beetles west of the community of Queen in the Guadalupe mountains. In Davenport Canyon and adjacent drainages of the Datil mountains, twig beetles killed pole-sized stands on both private and federal lands.

Aspen Defoliation:

Large Aspen Tortrix
Choristoneura conflictana

Western Tent Caterpillar
Malacosoma californicum

Marssonina Leaf Blight
Marssonina populi

Hosts: Aspen

Aspen defoliation caused by this complex of insects, diseases, and abiotic factors increased from 9,030 acres in 1994 to 14,245 acres in 1995. In Arizona, aspen defoliation totaled 2,705 acres. Defoliation on Federal lands in Arizona included the Apache-Sitgreaves National Forests (915 acres), Coconino National Forest (250 acres), Coronado National Forest (45 acres), Kaibab National Forest (675 acres), Prescott National Forest (30 acres), Tonto National Forest (15 acres), and Fort Apache Indian Reservation (775 acres). In New Mexico, aspen defoliation totaled 11,540 acres. Defoliation occurred on the Carson National Forest (4,520 acres), Cibola National Forest (800 acres), Gila National Forest (360 acres), Lincoln National Forest (840 acres), Santa Fe National Forest (4,600 acres), Santa Clara Pueblo Indian Reservation (80 acres), Taos Pueblo Indian Reservation (240 acres) and the Navajo Indian Reservation (100 acres).

Subalpine Fir Mortality Complex:

Armillaria Root Disease
Armillaria spp.

Western Balsam Bark Beetle
Dryocoetes confusus

Black Bear

Subalpine fir mortality caused by a complex of agents including western balsam bark beetle, Armillaria root disease and black bear was estimated to have occurred on 174 acres on Mt. Graham in the Pinaleno Mountains. Mortality consisted of widely scattered pockets of trees, variable in size. In most cases multiple mortality agents were found in the same mortality centers. Affected stands were generally densely stocked and showed abundant evidence of root disease. Several of these areas also had an abundance of broken tops, probably originating from the ice storms that occurred in the winter of 1992-1993.

Status Of Diseases

Annosus Root Disease

Heterobasidion annosum

Hosts: True firs, ponderosa pine

Root diseases and their associated pests are responsible for about one-third of the conifer mortality Region-wide. ***Heterobasidion annosum*** accounts for about 20 percent of this mortality. During surveys conducted on the North Kaibab Ranger District, ***H. annosum*** was found in approximately one percent of the standing live trees.

Armillaria Root Disease

Armillaria spp.

Hosts: Douglas-fir, ponderosa pine, true firs, spruce

Armillaria spp. account for about 80 percent of root disease mortality across the Region. A greater percentage of the mixed conifer and spruce-fir forests are infected compared to ponderosa pine type. Region 3 is working to determine the occurrence and effects of Armillaria and other root diseases in Southwest forests. During surveys conducted on the North Kaibab Ranger District, Armillaria was found in approximately 30% of the standing live trees.

Black Stain Root Disease

Leptographium wageneri varieties

Hosts: Pinyon pine, Douglas-fir

Both *Leptographium wageneri* var. *wagneri* which infects pinyon, and *L. wagneri* var. *pseudotsugae*, which infects Douglas-fir, are rare in the Southwestern Region. The former is confined to two isolated areas in northern New Mexico, and the latter has been observed only in sites in south-central New Mexico.

Ponderosa Pine Needle Cast

Lophodermella cerina

Hosts: Ponderosa pine

Ponderosa pine needle cast was detected on 600 acres in 1994 and 10,080 acres of host type in 1995. All of the 10,080 diseased acres occurred on the Cibola National Forest. Needle cast was not detected on ponderosa pine in Arizona in 1995. Seven hundred and sixty acres of ponderosa pine needle cast infected trees were detected in scattered pockets on State and private lands in Mora County east of Chacon and on the mesa tops east of Guadalupita, New Mexico

Dwarf Mistletoes

Arceuthobium spp.

Hosts: pines, Douglas-fir, spruce, true firs

Dwarf mistletoes are the most significant disease-causing organisms in the Southwestern Region. Over one million acres of National Forest commercial timberlands in each state have some level of dwarf mistletoe infection. Several hundred thousand additional infected acres occur in noncommercial and reserved areas, woodlands, and other public and private forest lands. There is some evidence that the incidence of dwarf mistletoe on ponderosa pine has increased in recent decades. This increase is likely a result of fire suppression (fire being the primary natural control agent) and selective cutting.

White Pine Blister Rust

Cronartium ribicola

Hosts: Southwestern white pine

White pine blister rust occurs throughout most of the range of southwestern white pine (***Pinus strobiformis***) in the Sacramento Mountains, White Mountains, and Capitan Mountains of southern New Mexico. Roughly one-half million acres are affected. This disease has not been found in Arizona.

Pinyon Needle Cast

Species unknown

Hosts: Pinyon pine

Scattered pockets of an unknown species of pinyon needle cast occurred on State and private lands on the east side of the Sangre de Cristo Mountains from Raton to Sapello, New Mexico. One thousand and forty acres of unknown pinyon needle cast caused defoliation were also aerially detected on State and private lands in Mora and Colfax counties.

Winter Injury

Hosts: Ponderosa pine

Winter injury was not detected from aerial or ground surveys in 1995.

Other Entomology and Pathology Activities in 1995

White Pine Blister Rust Monitoring

The New Mexico Zone has joined efforts with the Lincoln National Forest to gather stand exam data on the 14,000-acre Sacramento River Ecosystem Management Area. White pine blister rust (WPBR) data will be collected on about 1,100 of the 2,750 stand exam points that will be established. Since information will be collected on the full elevational range of Southwestern white pine, the only coniferous host in this mountain range, the current distribution of the WPBR relative to habitat type will be determined. The current infection level will also be determined. A subset of the 1,100 WPBR points will be monumented as permanent plots to record intensification of WPBR within this area relative to site conditions and habitat type.

Training

The Entomology and Pathology staff in the Southwestern Region offers training to personnel from the USDA Forest Service, USDI Bureau of Indian Affairs and National Park Service, as well as other interested Federal and State agencies and Tribal resource management agencies on a variety of subjects related to forest insect and disease management. Three types of training are offered. The first type of workshop is aimed at training recreation managers and their staffs the basics of hazard tree detection and management as well as insect and disease recognition. This workshop was held in Prescott in March 1995. A second workshop entitled "Identification, Effects and Management of Forest Insects and Diseases" took place in Ruidoso, New Mexico in September 1995. This second workshop is for resource specialists who participate on interdisciplinary teams where forest insects and diseases are a management concern. The third type of training we offer is an informal session on forest insect and disease identification intended for field-going personnel including markers, stand examiners, etc. This session is held upon request for 2 or more people. Contact your favorite insect and disease specialist for more information about these sessions.

Development of Cavity Nesting Habitat

In April of 1995, Catherine Parks, Pathologist, Pacific Northwest Research Station, gave a talk on the use of decay fungi for creating cavity nesting habitat in live trees. Wildlife biologists and other resource specialists from throughout the Region attended the talk. Personnel from the Coconino and Kaibab National Forests became interested in setting up similar projects on their forests. They will be inoculating trees with fungal cultures derived from local sources (decayed trees) in the fall of 1996. We will continue to help with implementation and monitoring of these projects.

Wood Import Pest Risk Assessment and Mitigation Evaluation Team

In September 1995, the Chief of the Forest Service and the Administrator for the Animal and Plant Health Inspection Service chartered a national standing team—the Wood Import Pest Risk Assessment and Mitigation Team—to provide a permanent source of technical expertise on the assessment of pest risks associated with importation of wood products into the United States. Borys Tkacz, Arizona Zone Leader, was appointed team leader for the 8-member team. The first report issued by the team was a review of the Pest Risk Analysis (PRA) for the territories of the European Union (as PRA area) on ***Bursaphelenchus xylophilus*** and its vectors in the genus ***Monochamus*** completed in October 1995. The team is currently initiating a pest risk assessment for the importation of ***Pinus*** and ***Abies*** logs from Mexico.

Douglas-fir Tussock Moth Early Warning Detection System

Since 1992, an early warning system to detect incipient outbreaks of the Douglas-fir Tussock Moth has been in operation in Arizona. The Douglas-fir tussock moth, *Orgyia pseudotsugata* occurs periodically in some mixed conifer forests in the southwest. In Arizona, there are two known historic outbreak areas: the Pinal Mountains and the Sierra Ancha Mountains near Globe on the Tonto National Forest. The insect has also been trapped in many other locations throughout the state. During outbreaks, defoliation of white fir and Douglas-fir can be spectacular and can result in both top-killing and tree mortality. This insect is very difficult to detect except during outbreaks which can develop rapidly and with little notice. We are also interested in monitoring this insect from a long term perspective since there are indications that the mixed conifer type is expanding in the Region. We believe that since many of these areas are relatively dry, they may be quite susceptible to tussock moth in the future.

To assist with monitoring of this insect, an early warning system was developed in the 1970's and is now used throughout much of the intermountain west. This system employs traps baited with a synthetic version of the female moth's sex attractant or pheromone. Traps are placed in groups of 5, spaced about 75 feet apart. An average catch of 40 moths per trap indicates that visible defoliation may be expected the following season.

Our program began in 1992 with traps placed in three general locations in the state—the Mogollon Rim near Payson, Pinal Mountains and Sierra Ancha Mountains. Since 1994, the Arizona State Land Department has also participated in this effort by placing traps in the vicinity of Pinetop, Greer, and Alpine. In 1995, the Safford Ranger District became interested following discovery of a small population of the moth on the north slope of West Peak in the Pinaleno Mountains. They are now assisting us by maintaining a plot in that area. Since we have begun monitoring, no outbreaks have occurred in the survey areas. In 1995, the highest trap catches were observed in the Reynolds Creek area in the Sierra Ancha Mountains and on West Peak in the Pinalenos. No plots exceeded the 40-moth threshold.

If you would like more information on this program, please contact Jill Wilson, Entomologist, Arizona Zone.

Effects of Slash Management Practices and Overstory Density on Ips spp. Brood Production in Ponderosa Pine Slash

In 1993, at the request of the San Carlos Agency and the San Carlos Tribe, an operative project was initiated to evaluate the effectiveness of slash management practices in reducing *Ips* brood production in ponderosa pine slash. Cooperating groups included Northern Arizona University, the San Carlos tribe and the Southwestern Region. Studies were conducted by Jaime Villa-Castillo and Victoria Wesley under the direction of Mike Wagner, Northern Arizona University and Jill Wilson, Entomologist, Arizona Zone Entomology and Pathology Group.

Results of these studies indicate that slash under a dense canopy could result in greater population increases and possibly more residual tree mortality. Slash under a plot thinned to 57 square feet of basal area had many fewer attacks than slash under dense canopies (128 and 156 square feet of basal area). Brood survival and the ratio of emerging to attacking adults (which provides an index to population trend) were also lowest in the lower density plots. This information supports the long recommended practice of lopping and scattering slash into openings as a way to reduce the risk of *Ips* beetle-caused tree mortality. Results do not support the idea of cutting slash pieces into shorter lengths as a way to reduce *Ips* brood production, at least under dense tree canopies.

For more information on this project, contact Jill Wilson, Entomologist, Arizona Zone.

Mountain Pine Beetle Susceptibility/Risk Rating in Southwestern Ponderosa Pine

This multi-region project is funded through the Forest Health Technology Development Program. It was funded beginning in 1995. The objective of the project is to determine significant factors affecting stand and landscape level susceptibility and risk to mountain pine beetle in southwestern ponderosa pine. This information will then be incorporated into an easy to use, flexible computer decision support system that will provide managers with a landscape description of susceptibility and risk. For more information on this project, contact Jill Wilson, Entomologist, Arizona Zone.

Site and Stand Factors Associated with the Occurrence of Roundheaded Pine Beetle Outbreaks in Ponderosa Pine

The roundheaded pine beetle, *Dendroctonus adjunctus* Blandford (RPB), is one of the most important bark beetles associated with ponderosa pine in southern New Mexico and Arizona. RPB outbreaks have been ongoing in both the Sacramento and Pinaleno Mountains, causing widespread tree mortality. No attempt has been made to quantify and model site and stand conditions conducive to infestations. The objective of this study, a cooperative effort involving the Rocky Mountain Forest and Range Experiment Station, Southwestern Region, Lincoln and Coronado National Forests, is to model probability of infestation occurrence during the early stages of an outbreak based on site, tree, or stand conditions. This information will be used to build a stand rating system for this insect in the

Southwest. During 1994 and 1995, intensive surveys were conducted in various stands representing different habitat types in the mixed conifer and ponderosa pine zones. Models to predict the likelihood of infestation have been built using Classification and Regression Trees (CART). These models may be of assistance to land managers in the implementation of silvicultural practices to reduce the likelihood of future catastrophic outbreaks of RPB. It appears that the RPB is selecting forested areas with high basal areas, slow tree growth, characteristics associated with high tree density conditions. It has been suggested that past fire suppression practices in the Southwest have resulted in an over abundance of densely stocked stands. Since that is the condition that the RPB appears to be preferring, fire suppression may have had a significant effect on the size of the current outbreaks of this insect. For more information about this project, contact Jill Wilson, Entomologist, Arizona Zone.

Pest Trend Impact Plots in the West

Since 1990, we have established permanent plots across the Region as part the technology development project: "Pest Trend Impact Plots of the West". In Region 3, we have established and monitored permanent plots in areas affected by dwarf mistletoe, root disease, and western spruce budworm. This information will be used to validate the pest subroutines of the Forest Vegetation Simulator Model, otherwise known as FVS.

Biological Evaluations And Functional Assistance Letters

Through biological evaluations and functional assistance letters, our staff provides information to affected land management agencies on new or existing insect and disease outbreaks or infestations. In biological evaluations and letters, the specialist reports on the current status and expected population trends of the insect or disease of concern, describes resource and ecological effects of insect or disease activity, and discusses alternatives for management.

The biological evaluations and functional assistance letters written in 1995 by the staff members of Entomology and Pathology are listed below.

Arizona Zone

1. Douglas-fir Tussock Moth Monitoring in Arizona, 1994. 2/95
2. Diagnosis of Alder Decline Along the Hassayampa River, Bradshaw Ranger District, Prescott National Forest. 2/95.
3. Functional Assistance Concerning Vegetation Management and Bark Beetle Prevention in the Indian Creek Campground, Bradshaw Ranger District. 2/95.
4. Biological Evaluations of Mountain Pine Beetle Activity on the North Kaibab Ranger District, Kaibab National Forest. 4/95.
5. Biological Evaluation of Dwarf Mistletoe Suppression Project on the San Carlos Indian Reservation. 7/95.
6. Functional Assistance to Fort McDowell Indian Reservation. 8/95.
7. Functional Assistance to the Lakeside Ranger District on a Bark Beetle Infestation in the Fool's Hollow Recreation Area. 10/95.
8. Functional Assistance to De Motte Campground. 11/95.
9. Review of European Union Pinewood Nematode Pest Risk Assessment. 11/95.
10. Functional Assistance to Safford Ranger District, Coronado National Forest. 12/95.

New Mexico Zone

1. Interim Posttreatment Evaluation for Potato Knob and Sixteen Springs Dwarf Mistletoe Control Projects, Lincoln National Forest. 3/95.
2. White Pine Blister Rust Scouting, Gallinas Peak, Cibola National Forest.
3. Pinyon Needle Scale Outbreak, Magdalena RD, Cibola National Forest. 6/95.
4. Pinyon Mortality, Laguna Indian Reservation. 6/95.
5. Pest Impact at Proposed Cayete Pumice Mine Site. 6/95.
6. Valle Grande and Borracho Dwarf Mistletoe Control Projects, El Rito RD, Carson National Forest. 7/95.
7. Dwarf Mistletoe Control Projects, Tres Piedras RD, Carson National Forest. 7/95.
8. Cerro Pavo Dwarf Mistletoe Control Project, Coyote RD, Santa Fe National Forest. 7/95.
9. Lamy Peak Dwarf Mistletoe Control Project, Tres Piedras RD, Carson National Forest. 7/95.
10. Proposed Dwarf Mistletoe Control Project, Jemez Indian Reservation. 7/95.
11. Alamitos Mesa Restoration/Dwarf Mistletoe Control Project, Espanola RD, Santa Fe National Forest. 8/95.
12. Pinon Pine Damage, Jicarilla Apache Indian Reservation. 10/95.
13. Forest Insect and Disease Conditions, Ceremonial Canyon, Picuris Pueblo. 10/95.
14. Proposed Board Tree and Lower Sixteen Springs Dwarf Mistletoe Control Projects, Sacramento RD, Lincoln National Forest. 10/95.
15. Dwarf Mistletoe Control Projects, Mescalero-Apache Indian Reservation. 10/95.
16. Western Spruce Budworm Damage, Chuska Mountains, Navajo Indian Reservation. 10/95.
17. Ips Beetle Activity, Mount Taylor RD, Cibola National Forest. 10/95.
18. Tree Decline and Death on the Quemado RD, Gila National Forest. 10/95.
19. Mount Taylor Ranger District Campground Evaluations. 10/95.
20. Monitoring of the Stand 100 Dwarf Mistletoe Control Project. 11/95.
21. Monitoring of the Acoma Pueblo Dwarf Mistletoe Control Projects. 12/95.

Publications

Anonymous. 1995. Forest Insect and Disease Conditions in the Southwestern Region 1994. USDA Forest Service, Southwestern Region. R3-95-3. 19pp.

Baker, M. B., Jr., Yolanda Chavez Huerta, Alvin L. Medina, and Steve Dudley. 1995. Applications of geographic information systems in assessments of El Carrizal Watershed. p. 105-114. In: Partnerships for Sustainable Forest Ecosystem Management. Celedonio Aguirre-Bravo et al., Ed., October 17-20, 1994, Guadalajara, Jalisco, Mexico. USDA, Forest Service, Rocky Mountain Forest and Range Experiment Station. General Technical Report RM-GTR-266.

Dudley, S. 1995. Airborne video, from the beginning. p. 3-6. In: Proceedings Aerial Pest Detection and Monitoring Workshop. Timothy J. McConnell, ED., April 26-29, 1994, Las Vegas, Nevada. USDA, Forest Service, Northern Region. Report 95-4

Dudley, S. 1995. Airborne video western perspectives. p.73-75. In: Proceedings Aerial Pest Detection and Monitoring Workshop. Timothy J. McConnell, ED., April 26-29, 1994, Las Vegas, Nevada. USDA, Forest Service, Northern Region. Report 95-4.

Fairweather, Mary Lou. 1995. Posttreatment Biological Evaluation of the 1981 Tusayan Dwarf Mistletoe Control Project. USDA Forest Service, Southwestern Region. R3-95-1. 8pp.

Frank, M. 1995. Southwestern Region Forest Pest Management GIS summary. p.53-54. In: Proceedings Aerial Pest Detection and Monitoring Workshop. Timothy J. McConnell, ED., April 26-29, 1994, Las Vegas, Nevada. USDA, Forest Service, Northern Region. Report 95-4.